

Notice of Allowability

Application No.

09/802,405

Examiner

Mohammad A. Siddiqi

Applicant(s)

WEBER ET AL.

Art Unit

2154

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 5/22/2006.
2. ☒ The allowed claim(s) is/are 1-6,8-25 and 27-38 (rearranged claims are 1-36).
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 05/22/2006, 7/30/05
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

JOHN FOLLANSBEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100

DETAILED ACTION

1. Claims 1-6, 8-25, and 27-38 are allowed.

REASONS FOR ALLOWANCE

2. The following is an examiner's statement of reasons for Allowance:
Examiner finds Applicant's arguments submitted in the remarks filed on 05/22/2006 to be persuasive.

Regarding claim 1, none of the cited prior art references discloses or render obvious the claimed method for providing an interface between the initiator functional block and target functional block does not block data transfers of other threads and mapping a data flow from the initiator functional block to the target functional block to a thread indicated by the thread identifier to meet a service guarantee on a per thread identifier basis.

Claims 2-5 and 8-13 depend from claim 1, and are thus allowed for the same reasons.

Claim 20 presents a apparatus for performing the same method as claim 1 and is thus allowed for the same reasons.

Claims 21-25 and 27-30 depend from claim 20, and are thus allowed for the same reasons.

Regarding claim 14, none of the cited prior art references discloses or render obvious the claimed method for storing transaction streams in a buffer, data transfers received after issuance of the busy signal until resources become available to service the buffered data transfers. Further, the amount of buffer sufficient to buffer any transfers that arrive after the busy signal is asserted so that an interface between the initiator functional block and target functional block does not block data transfers of other threads to meet a service guarantee on a per unique identifier basis.

Claims 15-19 depend from claim 14, and are thus allowed for the same reasons.

Claim 31 presents a apparatus for performing the same method as claim 14 and is thus allowed for the same reasons.

Claims 31-38 depend from claim 31, and are thus allowed for the same reasons.

3. Any comments considered necessary by applicant must be submitted no later than payment of the issue fee and, to avoid processing delays,

should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments Statement of Reasons for Allowance."

EXAMINER'S AMENDMENT

4. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Thomas S. Ferril on 08/03/2006.

5. Please amend the claims as attached.


Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mohammad A. Siddiqi whose telephone number is (571) 272-3976. The examiner can normally be reached on Monday -Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John A. Follansbee can be reached on (571) 272-3964. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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IN THE CLAIMS:

Please amend the claims as follows:

1. (Currently Amended) A method for communicating data between functional blocks in a computing device, comprising:

establishing a unique~~first~~ identifier for each independent transaction stream between an initiator functional block and a target functional block within a multiple threading system, wherein a plurality of independent transaction streams exist between the initiator functional block and the target functional block,

if the target functional block is unable to accept a data transfer from the initiator functional block, the target functional block issuing a busy signal identified by the unique~~first~~ identifier;

the initiator functional block withholding issuance of data transfers associated with the unique~~first~~ identifier in response to the issued busy signal, wherein data transfers not associated with the unique~~first~~ identifier identified by the issued busy signal may be issued;

using a credit signal to provide advance notice that the target functional block can accept one or more data transfers associated with the unique identifier, wherein the initiator functional block can issue a number of data transfers up to the data transfers indicated by the credit signal to

ensure a bus between the initiator functional block and the target functional block is non-blocking, via the use of credit signals, to enable a determination of service guarantees for the plurality of independent transaction streams on a per unique identifier basis; and

mapping a data flow from the initiator functional block to the target functional block ~~to~~for a first transaction stream indicated by its unique first identifier to meet ~~its~~ service guarantee on ~~a~~the per ~~first~~unique identifier basis.

2. (Original) The method as set forth in claim 1, wherein the busy signal comprises a signal that is maintained active when the target functional block is unable to accept data transfers.

3. (Currently Amended) The method as set forth in claim 1, wherein ~~the busy signal comprises a credit signal used to communicate a number of credits that to~~ indicate the one or more how many data transfers the target functional block can accept by communicating a number of credits available.

4. (Original) The method as set forth in claim 3, further comprising decrementing the number of credits for each active data transfer and

incrementing the number of credits upon freeing up of resources for further data transfers.

5. (Previously Presented) The method as set forth in claim 3, wherein the credit signal is generated by maintaining the credit signal in an active state for a number of clock cycles corresponding to the number of credits.

6. (Previously Presented) The method as set forth in claim 3, wherein the credit signal comprises a multi-bit coded signal indicative of the number of credits.

7. (Canceled)

8. (Currently Amended) The method as set forth in claim 1, further comprising the initiator functional block ~~stopping to send~~to stop sending data transfers so that the target functional block receives no more than a determined number of data transfers after issuance of the busy signal.

9. (Previously Presented) The method as set forth in claim 1, wherein the target functional block issues the busy signal no more than a determined number of clock cycles after the target functional block determines that it

has insufficient buffer space to receive data transfers from the initiator functional block.

10. (Previously Presented) The method as set forth in claim 8, further comprising the target functional block buffering the data transfers received after issuance of the busy signal until resources become available to service the buffered data transfers.

11. (Currently Amended) The method as set forth in claim ~~7~~1, wherein determining service guarantees comprises:

mapping the first transaction stream to data channels of components between the initiator functional block and the target functional block;

converting performance guarantees of selected data channels of the mapped first transaction stream such that ~~the~~ guarantees of the data channels are aligned to be uniform in units; and

aggregating the guarantees of the data channels for the first transaction stream.

12. (Previously Presented) The method as set forth in claim 11, wherein aggregating comprises a function selected from the group consisting of summing the guarantees of the data channels of the first transaction stream,

selecting the maximum guarantees of the data channels of the first transaction stream, and selecting the minimum guarantees of the data channels of the first transaction stream.

13. (Previously Presented) The method as set forth in claim 11, wherein the guarantees are selected from the group consisting of quality of service guarantees, performance guarantees, bandwidth guarantees, latency guarantees, maximum outstanding request guarantees and maximum variance in service latency guarantees.

14. (Currently Amended) A method for communicating data between functional blocks in a computing device, comprising:

establishing ~~at least one~~ two or more unique~~first~~ identifiers, each ~~first~~unique identifier associating a data transfer with a transaction stream that the data transfer between an initiator functional block and a target functional block ~~are~~is a part of, wherein a plurality of transaction streams exist between the initiator functional block and the target functional block;

if the target functional block is unable to accept a first data transfer from the initiator functional block, the target functional block issuing a busy signal identified by the unique~~first~~ identifier;

storing in a buffer one or more data transfers, including the first data transfer associated with its unique identifier, received by the target functional block after issuance of the busy signal ~~until resources become available to service the buffered data transfers~~, the amount of buffer space sufficient to buffer any transfers that arrive after the busy signal is asserted to ensure that, wherein an interface between the initiator functional block and the target functional block does not block the data transfers from the unique identifier associated with the first data transfer as well as other data transfers from the other transaction streams in the plurality of transaction streams of other threads until resources become available to service the buffered data transfers; and

mapping a data flow from the initiator functional block to the target functional block to a first transaction stream indicated by its unique~~first~~ identifier to meet a service guarantee on a per unique~~first~~ identifier basis within a multiple threading system.

15. (Currently Amended) The method as set forth in claim 14, wherein the target functional block issues ~~a~~the busy signal a determined number of clock cycles after the target functional block determines that it is unable to accept the first data transfer from the initiator functional block.

16. (Original) The method as set forth in claim 14, further comprising the target functional block receiving no more than a determined number of data transfers after issuance of the busy signal.

17. (Previously Presented) The method as set forth in claim 14, further comprising determining service guarantees for at least one transaction stream between a plurality of initiator functional blocks and target functional blocks.

18. (Previously Presented) The method as set forth in claim 17, wherein determining service guarantees comprises:

mapping the first transaction stream to data channels of components between the initiator functional block and the target functional block;

converting performance guarantees of selected data channels of the mapped first transaction stream such that guarantees of the data channels are aligned to be uniform in units; and

aggregating the guarantees of the data channels for the first transaction stream.

19. (Previously Presented) The method as set forth in claim 18, wherein aggregating comprises a function selected from the group consisting of

summing the guarantees of the data channels of the first transaction stream, selecting the maximum guarantees of the data channels of the first transaction stream, and selecting the minimum guarantees of the data channels of the first transaction stream.

20. (Currently Amended) A communication apparatus, comprising:

at least two functional blocks within a multiple threading system, wherein an initiator functional block communicates with a target functional block by establishing a connection; and

a bus coupled to each of the functional blocks and configured to carry a plurality of signals, wherein the plurality of signals comprises a first identifier configured to associate a data transfer with a transaction stream between the initiator functional block and the target functional block, and a credit signal identified by the first identifier, the credit signal issued by the target functional block to provide advance notice ~~indicate how many data transfers that~~ the target functional block can accept one or more data transfers associated with the first identifier, wherein the initiator functional block ~~associated~~ withholds issuance of data transfers associated with the first identifier if the credit signal indicates that the target functional block can accept no data transfers, and the bus being non-blocking, via the use of credit signals, to enable a determination of service guarantees for the

transaction streams between the initiator functional blocks and the target functional blocks on a per first identifier basis.

21. (Original) The apparatus as set forth in claim 20, wherein the busy signal comprises a signal that is maintained active when the target functional block is unable to accept data transfers.

22. (Currently Amended) The apparatus as set forth in claim 20, wherein ~~the busy signal comprises a credit signal used to communicate a number of credits that to~~ indicate the one or more how many data transfers the target functional block can accept by communicating a number of credits available.

23. (Original) The apparatus as set forth in claim 22, wherein the number of credits is decremented for each active data transfer and incremented upon freeing up of resources for further data transfers.

24. (Previously Presented) The apparatus as set forth in claim 22, wherein the credit signal is generated by maintaining the credit signal in an active state for a number of clock cycles corresponding to the number of credits.

25. (Previously Presented) The apparatus as set forth in claim 22, wherein the credit signal comprises a multi-bit coded signal indicative of the number of credits.

26. (Canceled).

27. (Original) The apparatus as set forth in claim 20, wherein the target functional block further comprises a buffer to receive data transfers issued by the initiator functional block after issuance of the busy signal by the target functional block and before receipt of the busy signal by the initiator functional block.

28. (Currently Amended) The apparatus as set forth in claim 27, wherein the service guarantees are determined by mapping the transaction stream to data channels of components between ~~an~~the initiator ~~device~~functional block and the target ~~device~~functional block, converting performance guarantees of selected data channels of the mapped transaction stream such that the guarantees of the data channels are aligned to be uniform in units, and aggregating the guarantees of the data channels for the transaction stream.

29. (Currently Amended) The apparatus as set forth in claim 28, wherein the aggregating comprises a function selected from the group consisting of summing the guarantees of the data channels of the transaction stream, selecting ~~the~~ maximum guarantees of the data channels of the transaction stream, and selecting ~~the~~ minimum guarantees of the data channels of the transaction stream.

30. (Currently Amended) The apparatus as set forth in claim ~~26~~ 20, wherein the guarantees are selected from the group consisting of quality of service guarantees, performance guarantees, bandwidth guarantees, latency guarantees, maximum outstanding request guarantees and maximum variance in service latency guarantees.

31. (Currently Amended) A communication apparatus, comprising:
at least two functional blocks within a multiple threading system where
a plurality of transaction streams can be concurrently processed between an
initiator functional block and a target functional block, wherein ~~an~~ the
initiator functional block communicates with ~~a~~ the target functional block by
establishing a connection;
a bus coupled to each of the functional blocks and configured to carry
a plurality of signals, wherein the plurality of signals comprises at least one

first identifier configured to associate a data transfer with a first transaction stream that the data transfer between ~~an~~the initiator functional block and ~~a~~the target functional block ~~are~~is a part of; wherein if the target functional block is unable to accept ~~a~~the data transfer from the initiator functional block, then the target functional block issuing a busy signal identified by the first identifier ~~and buffering data transfers received after issuance of the busy signal until resources become available to service the buffered data transfers; and~~

a buffer coupled to the target functional block, a size of the buffer sufficient to include ~~buffer any number of data transfers~~ associated with the first identifier that arrive ~~in the transaction stream~~ after the busy signal is ~~asserted~~ issued until the initiator functional block that issued the data transfer associated with the first identifier can react to the issued busy signal, wherein the bus implements a mapping algorithm to map a data flow of the first transaction stream and aggregate service guarantees from components between the initiator functional block and the target functional block.

32. (Currently Amended) The apparatus as set forth in claim 31, wherein the target functional block issues ~~a~~the busy signal a determined number of clock cycles after the target functional block determines that it is unable to accept a first data transfer from the initiator functional block.

33. (Original) The apparatus as set forth in claim 31, further comprising the target functional block receiving no more than a determined number of data transfers after issuance of the busy signal.

34. (Previously Presented) The apparatus as set forth in claim 31, further comprising the target functional block determining service guarantees for at least one transaction stream between a plurality of initiator functional blocks and target functional blocks.

35. (Currently Amended) The apparatus as set forth in claim 34, wherein the determining service guarantees comprises:

mapping the transaction stream to data channels of components between the initiator functional block and target functional block;

selectively converting determined service guarantees of data channels of components of the mapped transaction stream such that guarantees of the data channels are aligned to be uniform in units; and

aggregating the guarantees of the data channels for the transaction stream.

36. (Currently Amended) The apparatus as set forth in claim 35, wherein

the aggregating comprises a function selected from the group consisting of summing the guarantees of the data channels of the transaction stream, selecting ~~the~~ maximum guarantees of the data channels of the transaction stream, and selecting ~~the~~ minimum guarantees of the data channels of the transaction stream.

37. (Currently Amended) The apparatus as set forth in claim 31, wherein the ~~first~~unique identifier is a connection ID.

38. (Currently Amended) The apparatus as set forth in claim 31, wherein the ~~first~~unique identifier is a thread ID.